

# SOUTH DAKOTA STATEWIDE FISHERIES SURVEY

2102-F-21-R-42

**Name:** McCook Lake

**County:** Union

**Legal Description:** T89N-R48W-Sec 4, 9-10, 15-16, 21

**Location from nearest town:** 3 miles northwest of North Sioux City, SD

**Dates of present survey:** August 10-12, 2009 (netting); June 10, 2009 (electrofishing)

**Date last surveyed:** August 13-15, 2007 (netting); June 18, 2007 (electrofishing)

Primary Game Species	Secondary and Other Species
White Crappie	White Bass
Black Crappie	Bluegill
Largemouth Bass	Gizzard Shad
Channel Catfish	Shortnose Gar
Walleye	Bigmouth Buffalo
	Freshwater Drum
	Smallmouth Buffalo
	Common Carp
	Shorthead Redhorse

## PHYSICAL DATA

**Surface area:** 273 acres

**Watershed area:** 2,985 acres

**Maximum depth:** 14 feet

**Mean depth:** 6 feet

**Volume:** 732 acre feet

**Shoreline length:** 6.9 miles

**Contour map available:** No

**Date mapped:** NA

**Lake elevation observed during the survey:** Full

**Beneficial use classifications:** (5) warmwater semipermanent fish propagation, (7) immersion recreation, (8) limited-contact recreation, and (9) fish and wildlife propagation and stock watering.

## **Introduction**

McCook Lake is a natural oxbow lake located in southeast Union County. The lake was named for General John Cook who commanded a company of soldiers stationed there in 1864. It is unknown when or why the "Mc" was added.

## **Ownership of Lake and Adjacent Lakeshore Property**

McCook Lake is listed as a meandered lake in the State of South Dakota Listing of Meandered Lakes and the South Dakota Department of Game, Fish and Parks (GFP) manages the fishery. The entire shoreline of the lake is privately owned and heavily developed.

## Fishing Access

There is a city-owned boat ramp with a dock on the southeastern shore of the lake. Shore fishing access is extremely limited due to extensive shoreline development.

## Field Observations of Water Quality and Aquatic Vegetation

The water was cloudy gray with a Secchi depth measurement of 1 m (39.4 in) during the survey. There was some curly leaf pondweed (*Potamogeton crispus*), floating-leaf pondweed (*Potamogeton natans*), and brittle naiad (*Najas minor*) present. River bulrush (*Scirpus fluviatilis*) and cattails (*Typha* spp.) were also observed in a few shallow areas.

## BIOLOGICAL DATA

### Methods:

McCook Lake was sampled on August 10-12, 2009 with three overnight gill net sets and nine overnight trap net sets. The trap nets are constructed with 19-mm-bar-mesh ( $\frac{3}{4}$  in) netting, 0.9 m high x 1.5 m wide (3 ft high x 5 ft wide) frames and 18.3 m (60 ft) long leads. The gill nets are 45.7 m long x 1.8 m deep (150 ft long x 6 ft deep) with one 7.6 m (25 ft) panel each of 13, 19, 25, 32, 38 and 51-mm-bar-mesh ( $\frac{1}{2}$ ,  $\frac{3}{4}$ , 1,  $1\frac{1}{4}$ ,  $1\frac{1}{2}$ , and 2 in) monofilament netting. Two hours of nighttime electrofishing were done on June 10, 2009 to evaluate the largemouth bass population. A map of the sampling sites was not available.

### Results and Discussion:

## Gill Net Catch

Channel catfish, white bass, and gizzard shad made up the majority of the 2009 gill net sample (77.0%). Other species sampled included yellow perch, freshwater drum, walleye, and black crappie.

**Table 1.** Total catch from four overnight gill net sets at McCook Lake, Union County, August 10-12, 2009.

Species	Number	Percent	CPUE	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean Wr
Channel Catfish	23	35.4	7.7	$\pm 1.5$	16.2	56	6	84
White Bass	15	23.1	5.0	$\pm 0.7$	6.4	64	7	85
Gizzard Shad	12	18.5	4.0	$\pm 2.0$	12.2	100	0	98
Yellow Perch	7	10.8	2.3	$\pm 2.4$	0.4	--	--	--
Freshwater Drum	4	6.2	1.3	$\pm 0.4$	1.6	--	--	--
Walleye	3	4.6	1.0	$\pm 0.7$	0.8	--	--	--
Black Crappie	1	1.5	0.3	$\pm 0.4$	0.1	--	--	--

\* 5 years (1999, 2001, 2003, 2005, 2007)

**Table 2.** Catch per unit effort by length category for various fish species captured with gill nets in McCook Lake August 10-12, 2009.

Species	Substock	Stock	S-Q	Q-P	P+	All sizes	80% C.I.
Channel Catfish	1.7	6.0	2.7	3.0	0.3	7.7	<u>+1.5</u>
White Bass	0.3	4.7	1.7	2.7	0.3	5.0	<u>+0.7</u>
Gizzard Shad	--	4.0	--	4.0	--	4.0	<u>+2.0</u>
Yellow Perch	0.6	1.7	1.7	--	--	2.3	<u>+2.4</u>
Freshwater Drum	--	1.3	--	1.3	--	1.3	<u>+0.4</u>
Walleye	--	1.0	0.3	0.7	--	1.0	<u>+0.7</u>
Black Crappie	--	0.3	0.3	--	--	0.3	<u>+0.4</u>

Length categories can be found in Appendix A.

## **Trap Net Catch**

Black crappie, bluegill, and white crappie were the most abundant species in the 2009 trap net sample (86.3 %) (Table 2). Other species sampled included freshwater drum, channel catfish, white bass, common carp, shorthead redhorse, walleye and yellow perch.

**Table 3.** Total catch from ten overnight trap net sets at McCook Lake, Union County, August 10-12, 2009.

Species	Number	Percent	CPUE <sup>1</sup>	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean Wr
Black Crappie	55	42.0	6.1	<u>+3.0</u>	4.9	54	16	101
Bluegill	41	31.3	4.6	<u>+4.0</u>	2.3	80	0	100
White Crappie	17	13.0	1.9	<u>+0.8</u>	12.4	41	24	90
Freshwater Drum	6	4.6	0.7	<u>+0.6</u>	0.7	--	--	--
Channel Catfish	4	3.1	0.4	<u>+0.4</u>	0.8	--	--	--
White Bass	3	2.3	0.3	<u>+0.3</u>	1.1	--	--	--
Common Carp	2	1.5	0.2	<u>+0.2</u>	0.3	--	--	--
Shorthead Redhorse	1	0.8	0.1	<u>+0.1</u>	0.0	--	--	--
Walleye	1	0.8	0.1	<u>+0.1</u>	0.0	--	--	--
Yellow Perch	1	0.8	0.1	<u>+0.1</u>	0.0	--	--	--

\* 5 years (1999, 2001, 2003, 2005, 2007)

<sup>1</sup> See Appendix A for definitions of CPUE, PSD, RSD-P, and mean Wr.

**Table 4.** Catch per unit effort by length category for various fish species captured with trap nets in McCook Lake August 10-12, 2009.

Species	Substock	Stock	S-Q	Q-P	P+	All sizes	80% C.I.
Black Crappie	2.0	4.1	1.9	1.6	0.6	6.1	$\pm 3.0$
Bluegill	--	4.6	0.9	3.7	--	4.6	$\pm 4.0$
White Crappie	--	1.9	1.1	0.3	0.5	1.9	$\pm 0.8$
Freshwater Drum	0.2	0.4	0.2	0.2	--	0.7	$\pm 0.6$
Channel Catfish	--	0.4	0.1	0.2	0.1	0.4	$\pm 0.4$
White Bass	--	0.3	0.1	0.1	0.1	0.3	$\pm 0.3$
Common Carp	--	0.2	--	0.1	0.1	0.2	$\pm 0.2$
Shorthead Redhorse	--	0.1	--	--	0.1	0.1	$\pm 0.1$
Walleye	--	0.1	--	--	0.1	0.1	$\pm 0.1$
Yellow Perch	--	0.1	--	0.1	--	0.1	$\pm 0.1$

Length categories can be found in Appendix A.

## **Electrofishing Catch**

Ninety-one largemouth bass with a PSD of 18, RSD-P of 7, and a mean Wr of 92 were sampled in two hours of nighttime electrofishing (Table 3).

**Table 5.** Total catch from two hours of nighttime electrofishing on McCook Lake, Union County, June 10, 2009.

Species	Number	Percent	CPUE	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean Wr
Largemouth Bass	91	100	45.5	$\pm 8.0$	16.2	18	7	92

\* 5 years (1999, 2001, 2003, 2005, 2007)

## **Largemouth Bass**

**Management objective:** Maintain a largemouth bass fishery with an electrofishing CPH of at least 20, PSD = 40-70 and RSD-P = 20-40.

Largemouth bass electrofishing CPUE increased significantly in 2009 (Table 6) and now surpasses the management objective. Bass growth in McCook Lake is faster than the Region III average (Table 10). A relatively uniform distribution of fish from 210-540 mm (Figure 4; 8.3-21.3 in) and the presence of eight year classes suggest consistent natural recruitment. No age-0 or age-1 bass were sampled this year but a strong year class was produced in 2007 (Table 7).

**Table 6.** Largemouth bass electrofishing CPUE, PSD, RSD-P, and mean Wr for McCook Lake, Union County, 2001-2009.

	2001	2002	2003	2004	2005	2006	2007	2008	2009	Mean*
CPUE	17.0		10.0		14.0		13.5		45.5	16.2
PSD	55		68		89		50		18	59
RSD-P	16		21		29		15		7	18
Mean Wr	90		98		91		105		92	96

\*5 years (1999, 2001, 2003, 2005, 2007)

**Table 7.** Average back-calculated lengths (mm) for each age class of largemouth bass in McCook Lake, Union County, 2009.

Year Class	Age	N	Back-calculation Age							
			1	2	3	4	5	6	7	8
2007	2	55	142	238						
2006	3	19	131	209	265					
2005	4	9	114	219	266	290				
2004	5	3	102	213	287	341	368			
2003	6	1	123	291	330	355	387	402		
2002	7	2	133	233	305	337	365	381	395	
2001	8	1	181	258	335	386	420	457	489	502
1999	10	1	141	301	342	379	433	465	486	505
<b>All Classes</b>		<b>91</b>	<b>133</b>	<b>245</b>	<b>304</b>	<b>348</b>	<b>395</b>	<b>426</b>	<b>457</b>	<b>504</b>
Statewide Mean			96	182	250	305	342			
Region III Mean			111	212	287	347	383			
LLI* Mean			89	178	256	316	359			

\*Large Lakes and Impoundments (>150 acres)

## **White Crappie**

**Management objective:** Maintain a fishery with a combined black and white crappie trap net CPUE of at least 20 and PSD of at least 40.

White crappie abundance has barely changed since 2003 (Table 8) and is still well below the management objective. Sampled white crappies ranged in length from 13-30 cm (5.1-11.8 in ; Figure 1) and the overall size structure of the population has increased slightly which indicates some young fish are recruiting (Figure 1). White crappie condition (mean Wr) dropped back to the low of 90 seen in 2005 (Table 8).

**Table 8.** White crappie trap-net CPUE, PSD, RSD-P, and mean Wr for McCook Lake, Union County, 2001-2009.

	2001	2002	2003	2004	2005	2006	2007	2008	2009	Mean*
CPUE	10.2		48.9		1.2		1.3		1.9	12.4
PSD	38		17		67		38		41	40
RSD-P	0		3		58		8		24	17
Mean Wr	119		107		90		105		90	105

\*5 years (1999, 2001, 2003, 2005, 2007)

## **Black Crappie**

**Management objective:** Maintain a crappie fishery with a trap net CPUE of at least 20 and PSD of at least 40.

Even though black crappie trap net CPUE increased in 2009 (Table 9), it remains far below the management objective. Black crappies are slightly more abundant than white crappies, possibly due to improved water clarity and habitat. The black crappies sampled ranged in length from 10-27 cm (3.9-10.6 in; Figure 2), and size structure of crappies sampled since 2007 has greatly improved from previous surveys.

**Table 9.** Black crappie trap-net CPUE, PSD, RSD-P, and mean Wr for McCook Lake, Union County, 2001-2009.

	2001	2002	2003	2004	2005	2006	2007	2008	2009	Mean*
CPUE	38.6		0.0		11.1		1.5		6.1	11.0
PSD	22		--		21		73		54	40
RSD-P	0		--		0		20		16	6
Mean Wr	107		--		107		98		101	108

\*5 years (1999, 2001, 2003, 2005, 2007)

## **Bluegill**

**Management objective:** Maintain a bluegill fishery with a trap net CPUE of at least 20 and RSD-18 of at least 20.

Bluegill trap-net CPUE increased to 4.6 in 2009 (Table 10) which is double the five-year mean but far below the management objective. As with crappies, bluegill size structure has improved with the population now supporting some harvestable-size fish (Figure 3).

**Table 10.** Bluegill trap-net CPUE, PSD, RSD-18, RSD-P, and mean Wr for McCook Lake, Union County, 2001-2009.

	2001	2002	2003	2004	2005	2006	2007	2008	2009	Mean*
CPUE	1.4		7.4		0.8		1.6		4.6	2.3
PSD	--		5		--		19		80	12
RSD-18	--		0		--		0		7	0
RSD-P	--		0		--		0		0	0
Mean Wr	--		98		--		115		100	107

\*5 years (1999, 2001, 2003, 2005, 2007)

## **Channel Catfish**

**Management objective:** Maintain a channel catfish fishery with a gill net CPUE of at least 15.

Channel catfish gill net CPUE has fallen below our management objective for the first time since 2001 (Table 11). No stocking has been done since 1993 (Table 13). Channel catfish ranged in length from 150- 620 mm (5.9- 24.4 in).

**Table 11.** Channel catfish gill net CPUE, PSD, RSD-P, and mean Wr for McCook Lake, Union County, 2001-2009.

	2001	2002	2003	2004	2005	2006	2007	2008	2009	Mean*
GN CPUE	13.7		19.0		24.5		20.3		7.7	16.2
PSD	19		56		15		48		56	35
RSD-P	0		0		2		5		6	2
Mean Wr	--		85		86		92		84	88

\*5 years (1999, 2001, 2003, 2005, 2007)

## **All Species**

Eleven different species were sampled in 2009 (Table 12). Bluegill trap net CPUE and yellow perch gill net CPUE were at the highest levels recorded. Gizzard shad gill net CPUE was at the lowest level recorded. Catches for other species remain within previously observed ranges.

**Table 12.** Gill-net (GN) and trap-net (TN) CPUE for all fish species sampled in McCook Lake, Union County, 1995-2009.

Species	1995	1997	1999	2001	2003	2005	2007	2009
<b>SNG (GN)</b>	--	1.0	0.3	1.3	2.7	--	0.5	--
<b>SNG (TN)</b>	0.3	0.1	0.5	0.1	1.0	0.1	0.2	--
<b>GZD (GN)</b>	13.5	19.0	6.7	22.0	18.3	7.0	7.0	4.0
<b>GZD (TN)</b>	0.2	--	0.1	--	--	--	--	--
<b>COC (GN)</b>	0.5	--	0.3	0.3	0.7	--	--	--
<b>COC (TN)</b>	1.0	0.2	0.2	0.5	0.3	0.3	0.3	0.2
<b>RIC (GN)</b>	--	--	--	--	--	--	--	--
<b>RIC (TN)</b>	0.1	--	--	--	--	--	--	--
<b>SAB (GN)</b>	--	--	--	0.3	0.3	--	--	--
<b>SAB (TN)</b>	--	--	--	--	--	--	--	--
<b>BIB (GN)</b>	--	0.5	--	--	--	--	0.8	--
<b>BIB (TN)</b>	0.2	--	--	--	--	--	0.1	--
<b>SHR (GN)</b>	--	--	--	--	0.3	--	--	--
<b>SHR (TN)</b>	--	--	--	--	0.1	0.1	--	0.1
<b>BCF (GN)</b>	--	--	--	--	--	--	--	--
<b>BCF (TN)</b>	--	--	--	--	--	--	--	--
<b>CCF (GN)</b>	0.5	1.0	3.3	13.7	19.0	24.5	20.3	7.7
<b>CCF (TN)</b>	0.2	--	0.2	--	1.5	0.8	1.4	0.4
<b>WHB (GN)</b>	0.5	6.5	18.3	2.3	1.3	2.5	7.5	5.0
<b>WHB (TN)</b>	4.8	0.9	0.7	--	0.7	0.6	3.3	0.3
<b>BLG (GN)</b>	--	--	--	--	--	--	--	--
<b>BLG (TN)</b>	0.1	0.4	0.2	1.4	7.4	0.8	1.6	4.6
<b>LMB (GN)</b>	--	--	--	--	--	--	2.5	--
<b>LMB (TN)</b>	--	--	--	--	--	--	0.3	--
<b>WHC (GN)</b>	--	--	--	0.7	5.7	--	0.3	--
<b>WHC (TN)</b>	--	--	0.2	10.2	48.9	1.2	1.3	1.9
<b>BLC (GN)</b>	0.5	--	0.3	--	--	--	--	0.3
<b>BLC (TN)</b>	2.8	0.6	4.0	8.0	--	11.1	1.5	6.1
<b>YEP (GN)</b>	--	--	--	--	0.3	--	1.5	2.3
<b>YEP (TN)</b>	0.2	0.1	--	--	--	--	0.2	0.1
<b>SAR (GN)</b>	--	--	--	--	0.3	--	--	--
<b>SAR (TN)</b>	--	--	--	--	--	--	--	--
<b>SXW (GN)</b>	0.5	--	--	--	--	--	--	--
<b>SXW (TN)</b>	0.4	--	--	0.2	--	--	--	--
<b>WAE (GN)</b>	--	--	0.3	--	0.7	--	2.8	1.0
<b>WAE (TN)</b>	--	0.3	0.1	--	0.1	--	--	0.1
<b>FRD (GN)</b>	6.0	1.5	5.0	1.0	1.3	0.5	0.3	1.3
<b>FRD (TN)</b>	1.2	0.5	0.4	0.2	1.5	0.5	0.7	0.7

SNG (Shortnose Gar), GZD (Gizzard Shad), COC (Common Carp), BIB (Bigmouth Buffalo), SAB (Smallmouth Buffalo), RIC (River Carpsucker), SHR (Shorthead Redhorse), CCF (Channel Catfish), BCF (Blue Catfish), WHB (White Bass), BLG (Bluegill), LMB (Largemouth Bass), BLC (Black Crappie), WHC (White Crappie), YEP (Yellow Perch), SAR (Sauger), SXW (Saugeye), WAE (Walleye), FRD (Freshwater Drum)

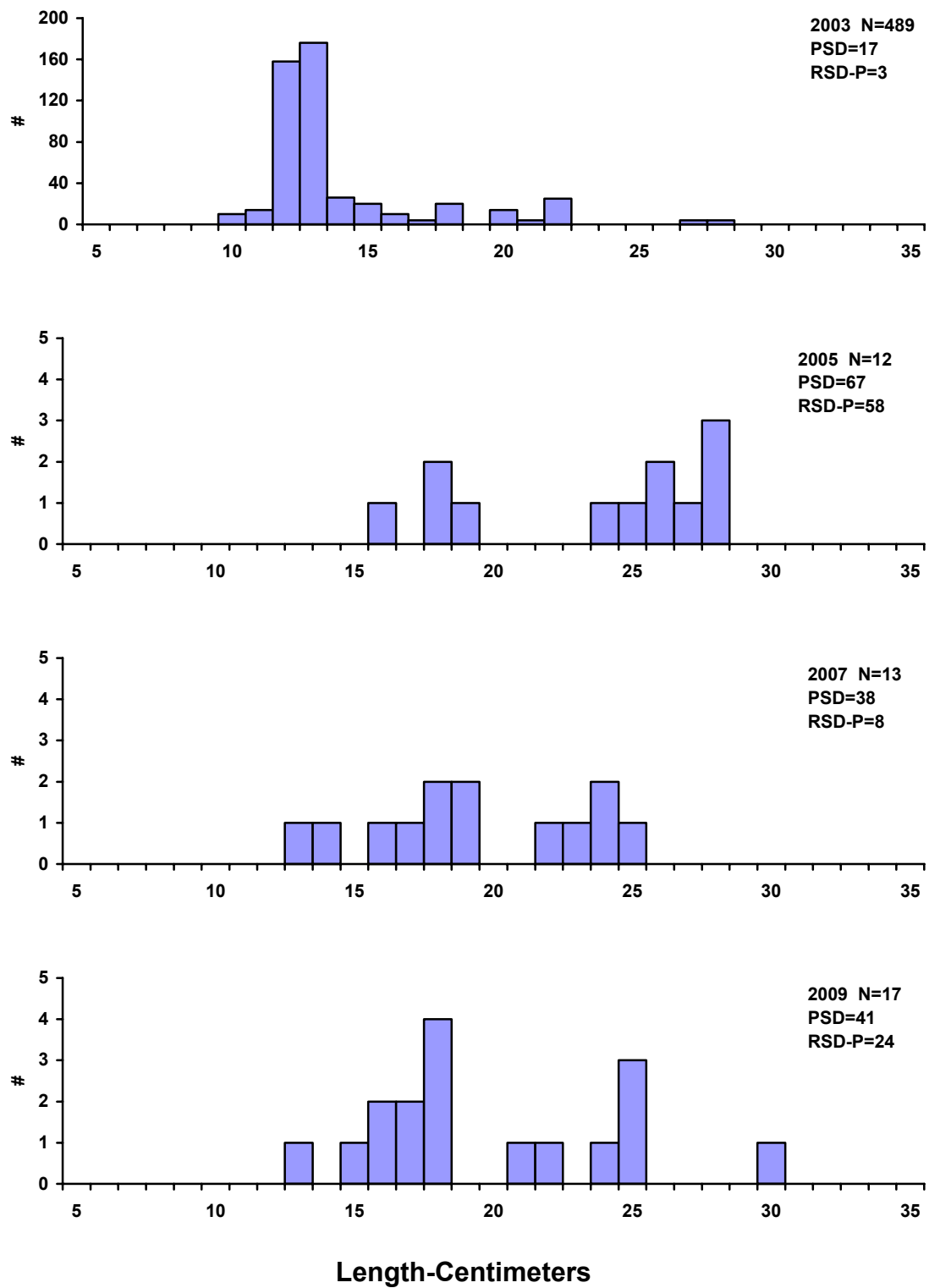


**Table 13.** Stocking record for McCook Lake, Union County, 1991-2009.

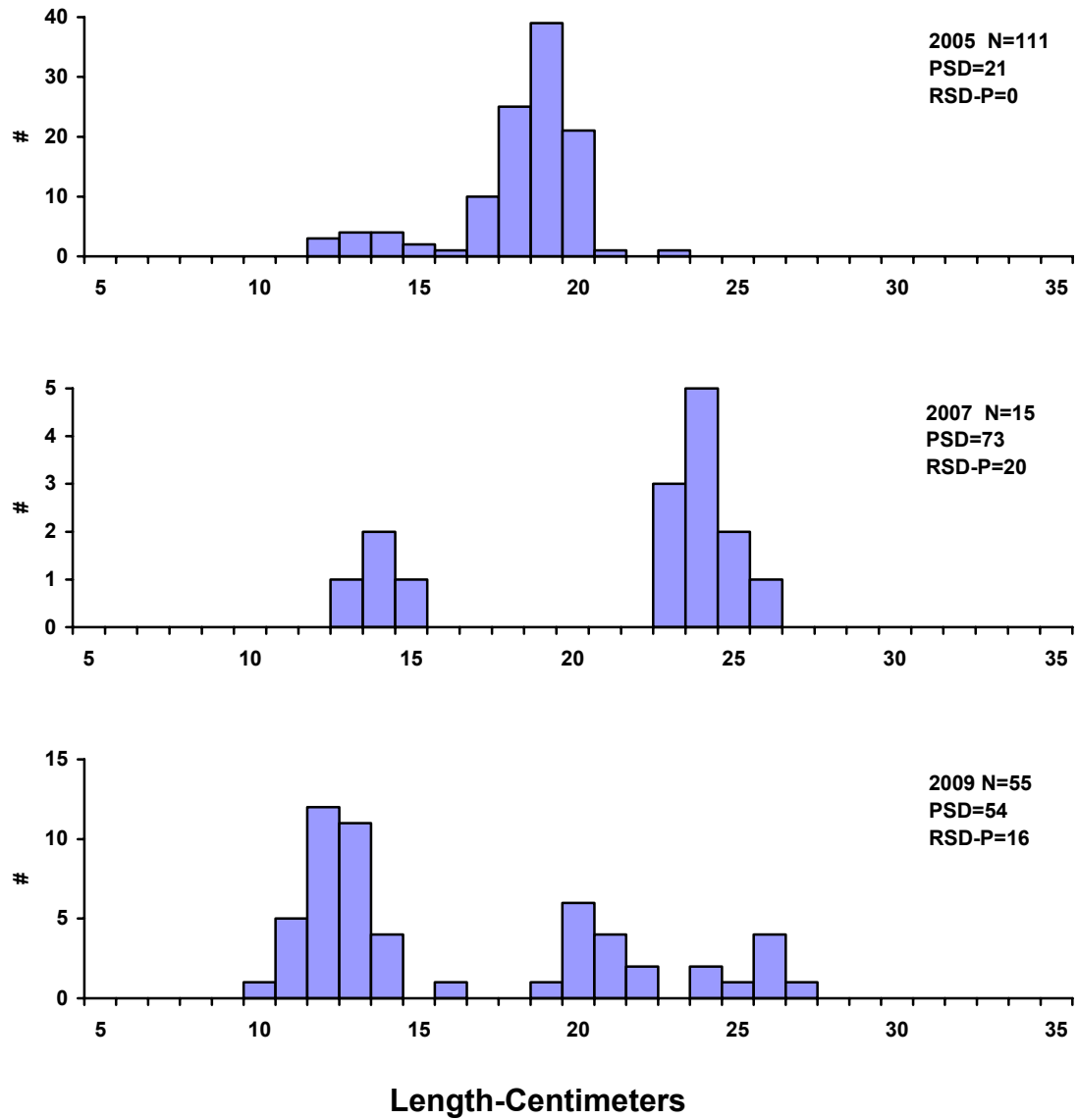
<b>Year</b>	<b>Number</b>	<b>Species</b>	<b>Size</b>
1991	30,000	Walleye	Fingerling
	15,000	Channel Catfish	Fingerling
1993	30,000	Channel Catfish	Fingerling
1994	100,000	Saugeye	Fingerling
	5,157	Saugeye	Lrg. Fingerling
1995	27,400	Saugeye	Fingerling
1996	30,000	Bluegill	Fingerling
1997	6,000	Walleye	Fingerling
1999	54,000	Walleye	Fingerling
	510	White Crappie	Adult
2000	2,796	White Crappie	Adult

### **MANAGEMENT RECOMMENDATIONS**

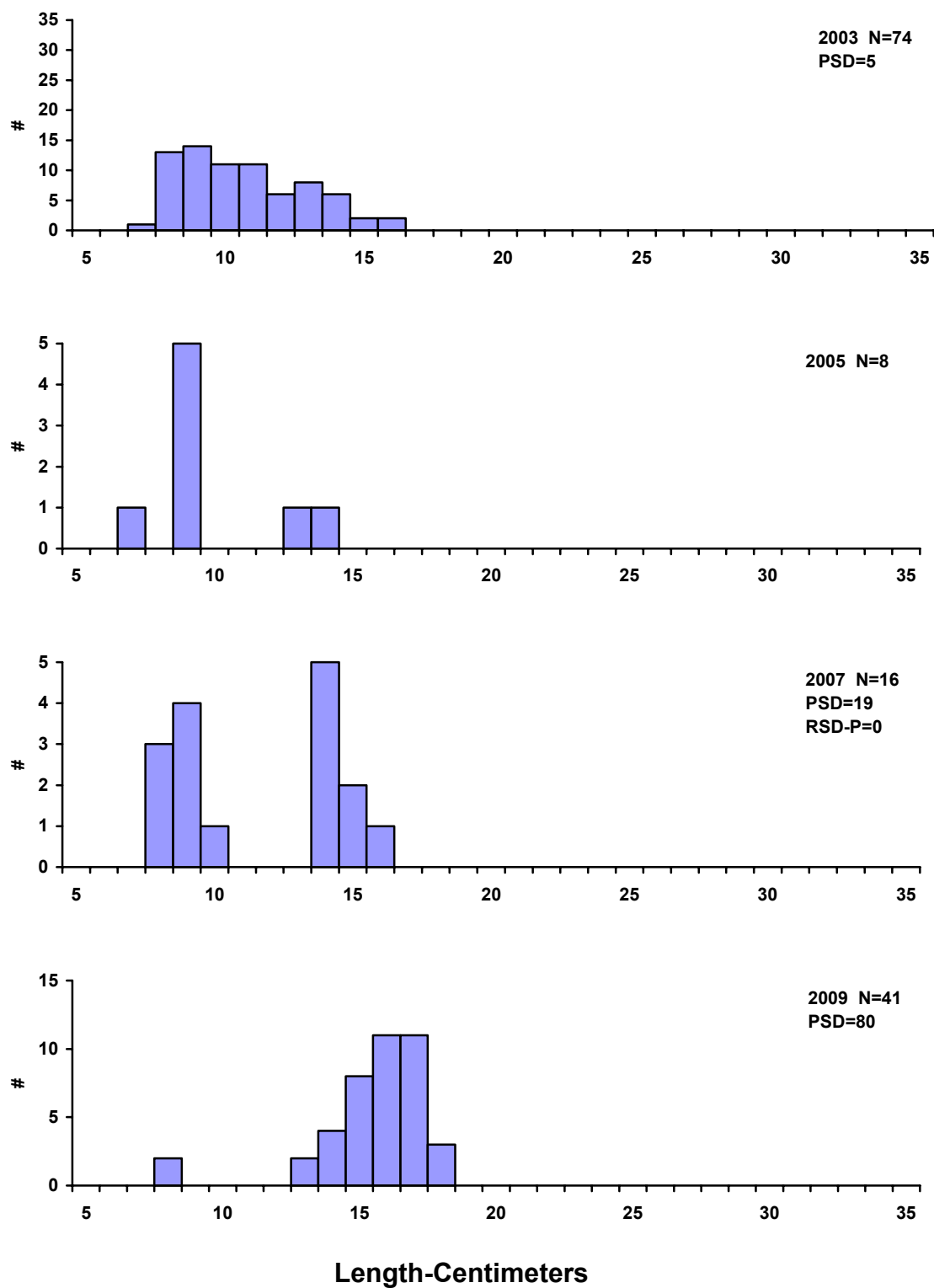
1. Continue to monitor the fishery by conducting lake surveys every other year.



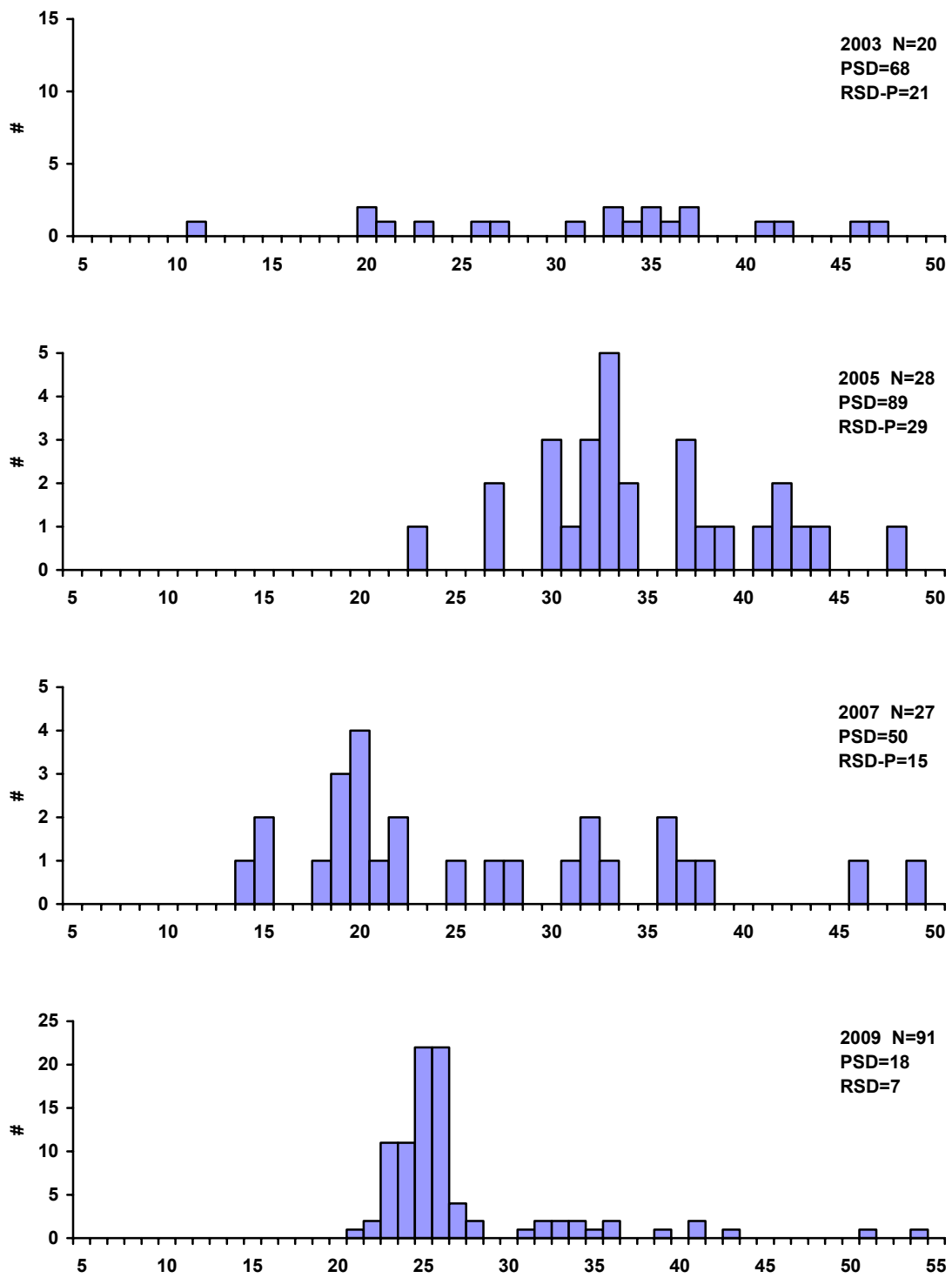
**Figure 1.** Length frequency histogram for white crappies sampled with trap nets in McCook Lake, Union County, 2003, 2005, 2007, and 2009.



**Figure 2.** Length frequency histogram for black crappies sampled with trap nets in McCook Lake, Union County, 2005, 2007, and 2009.



**Figure 3.** Length frequency histograms for bluegills sampled with trap nets in McCook Lake, Union County, 2003, 2005, 2007, and 2009.



### Length-Centimeters

**Figure 4.** Length frequency histograms for largemouth bass sampled by electrofishing in McCook Lake, Union County, 2003, 2005, 2007, and 2009.

**Appendix A.** A brief explanation of catch per unit effort (CPUE), proportional stock density (PSD), relative stock density (RSD) and relative weight (Wr).

**Catch Per Unit Effort (CPUE)** is the catch of animals in numbers or in weight taken by a defined period of effort. Can refer to trap-net nights of effort, gill-net nights of effort, catch per hour of electrofishing, etc.

**Proportional Stock Density (PSD)** is calculated by the following formula:

$$\text{PSD} = \frac{\text{Number of fish} > \text{quality length}}{\text{Number of fish} \geq \text{stock length}} \times 100$$

**Relative Stock Density (RSD-P)** is calculated by the following formula:

$$\text{RSD-P} = \frac{\text{Number of fish} > \text{preferred length}}{\text{Number of fish} \geq \text{stock length}} \times 100$$

PSD and RSD-P are unitless and usually calculated to the nearest whole digit.

Size categories for selected species found in Region 3 lake surveys, in centimeters.

Species	Stock	Quality	Preferred	Memorable	Trophy
Walleye	25	38	51	63	76
Sauger	20	30	38	51	63
Yellow perch	13	20	25	30	38
Black crappie	13	20	25	30	38
White crappie	13	20	25	30	38
Bluegill	8	15	20	25	30
Largemouth bass	20	30	38	51	63
Smallmouth bass	18	28	35	43	51
Northern pike	35	53	71	86	112
Channel catfish	28	41	61	71	91
Black bullhead	15	23	30	38	46
Common carp	28	41	53	66	84
Bigmouth buffalo	28	41	53	66	84
Smallmouth buffalo	28	41	53	66	84

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For most fish, 30-60 or 40-70 are typical objective ranges for “balanced” populations. Values less than the objective range indicate a population dominated by small fish while values greater than the objective range indicate a population comprised mainly of large fish.

**Relative weight (Wr)** is a condition index that quantifies fish condition (i.e., how much does a fish weigh for its length). A Wr range of 90-100 is a typical objective for most fish species. When mean Wr values are well below 100 for a size group, problems may exist in food and feeding relationships. When mean Wr values are well above 100 for a size group, fish may not be making the best use of available prey.